

Enrichment – Centripetal Force

Instructions

Complete all workings on a separate sheet of paper and submit by the due date given on the weebly page.

Experiment

Hang a mass from a string, which will be used as a pendulum.

Record the following data with absolute and percentage uncertainties:

1. Radius of the pendulum
2. Mass of the hanging object (feel free to research online if needed)
3. Height of initial drop
4. Force of tension of the string at the bottom of the swing. If needed, you may borrow a spring scale from McKeon. You are able to complete most of the calculations without the spring scale if you want to get this data last.

Draw the following force diagrams:

1. Pendulum at the top of its swing (include a force summation statement with your diagram)
2. Pendulum at the bottom of its swing (include a force summation statement with your diagram)

Calculations:

1. Using conservation of energy, calculate the speed of the pendulum at the bottom of the swing.
2. Calculate the centripetal force that the pendulum experiences at the bottom of the swing.
3. Calculate the force of tension of the string at the bottom of the swing.
4. Calculate the percentage uncertainty of this value
5. Compare this calculated force of tension to the one you measured in your experiment. Give a percent difference.

Analysis Questions:

1. What provides the centripetal force in this case?
2. What is a possible source of error for why your calculated and measured tension forces were different?
3. Choose either the mass, radius, or height of drop. What would happen if you were to increase that value? Give a detailed explanation for your response.